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Obituary

THE LATE MR. T. B. GOODALL, F.R.C.V.S., F.L.S.

BORN in 1850, Mr. T. B. Goodall was the fourth son of Will Goodall, the famous huntsman of the Belvoir, and although at first a sailor (he rose to be fourth mate on a sailing vessel), his love of the animal converted him into a Veterinary Surgeon; the Royal College of Veterinary Surgeons claimed him as a graduate in 1873. He went through the London College with honours, gaining the Colman and other medals.

Starting in practice at Brighton, he presently removed to Christchurch, Hants, where he remained until his retirement in 1908, and subsequent death last month.

Taking up his Fellowship and being elected a Fellow of the Linnæan Society, he acted as Examiner in Anatomy for the Diploma of the Royal College of Veterinary Surgeons between 1895 and 1898. Outside the profession he was well known for his researches on the life history of the Forest Fly, on which his name was an authority. As an anatomist he displayed no mean knowledge, and in the South Kensing-

ton Museum and the Museum of the Royal College of Veterinary Surgeons at Red Lion Square there are anatomical specimens of the skulls and teeth of horses which are a marvellous attribute to his skill and patience.

After his retirement from active practice, he made several visits to South Africa to visit his son, Major Alec. Goodall, F.R.C.V.S., taking advantage of his stay there to make studies of the flora and fauna of the district, and bringing home many specimens to enrich his private museum. On the outbreak of war he did useful work under the Veterinary Department of the Government, and "did his bit" to help amongst the sick and suffering horses.

In regretting the loss of so fine a character, we are proud to have counted him amongst our colleagues, and feel that his upright and manly life must always be a source of inspiration and encouragement to those of a younger generation.

Editorials.

STERILITY.

THE question of Sterility, especially in cattle, has become of such great importance that it may almost be said to count amongst one of the first half dozen diseases which at the present time cause the greatest loss to the agriculturist, and help to ruin his herds.

It is time that serious attention is drawn to it, and anything which may help to ameliorate this condition will be welcomed by the professiтn.

The paper from Mr. Pugh in our last issue, and that by Mr. Maguire in the present number are interesting reading, and the demonstration by the latter gentleman at the National Veterinary Meeting will attract a large audience. To those who have pedigree cattle, it is one of the most worrying problems, as inutility for breeding purposes converts a beast whose value runs into hundreds of pounds into being merely the price of beef—a loss not only from the pecuniary, but also to the breeding world, and this, to Great Britain, a country looked upon as the one from which so many of the best pedigree stock of the world originate, is a matter of the greatest importance.

All efforts, therefore, to overcome the trouble will be welcomed, and if successful will reflect credit on us as a scientific profession.

RESEARCH SCHOLARSHIP.

ATTENTION is drawn in another column to the two Research Scholarships offered by the Ministry of Agriculture for which graduates of the veterinary profession are available. Although not too lavish in their amount with the present purchasing price of money, they afford an opportunity to enter into the scientific world, and, what is still more, a chance to carry out a further course of study as a finish to his professional education. It is to be hoped that some of our younger graduates will take advantage of them and do work which will leave its mark upon the world for the benefit of the profession and the animal kingdom.

COMPARATIVE PATHOLOGY AT THE BRITISH MEDICAL ASSOCIATION.

AT the recently held British Medical Association Congress Meeting at Glasgow, a new departure was made in that a Section of Comparative Pathology was held, and to this members of the Veterinary profession were invited to contribute papers and join in the discussion. The result was a definite success, and the mixed audience of speakers was unanimous in declaring it to be an experiment worth repeating. All agreed that very much was to be gained by working in combination, and a fascinating paper by Professor Lang, F.R.S., on Plant Diseases, together with some remarks from Sir Clifford Allbutt, F.R.S., and Sir Wm. Macewen, C.B., LL.D., F.R.S., D.Sc., the President of the Congress, illustrated full well that the veterinary practitioner could make himself of the greatest value to his medical *confrère* in their mutual endeavour for the conquest of disease.

General Articles.

NYMPHOMANIA.

By L. C. MAGUIRE, F.R.C.V.S.
Fairford, Gloucestershire.

THERE occurs in all species of domestic animals, though pre-eminently in the cow and mare, a type of disease, the most noticeable clinical objective symptoms being increased, abnormal sexual appetite, with further somatic and psychic changes of the individual. A condition showing such a train of symptoms is called nymphomania.

Up to the present the changes which occur in an animal suffering from this condition were thought to be referable to changes which had taken place in the ovaries, which latter changes consisted of cystic degeneration of these organs. But cystic ovaries may be present without causing any of the symptoms of nymphomania, therefore no feasible explanation has so far been given as to why, in one case, cystic ovaries may be associated with all the typical symptoms of sexual mania, whereas in other cases there is no deviation from the normal physical condition of the animal.

For some considerable time I have been working on this subject in connection with other diseases of the reproductive system, and I find that the various abnormal conditions found in nymphomania are all possibly referable to an instability of one or more glands of the endocrine system. In order to better understand the abnormal functional changes which occur in the various endocrine glands in this disease, and which I shall subsequently describe, I will first give a resumé of the most typical symptoms seen in nymphomania.

As mentioned above, this disease is more frequent in cows and mares and in pedigree animals than in the coarser low grade ones; hence it is frequently seen in pedigree dairy cows, half bred and thoroughbred mares. In cows it is more common in animals in their prime of life, and frequently follows such conditions as abortion, premature labour, or any condition which is liable to be followed by uterine infections. In mares it is frequently seen in animals which have never bred, and which are confined to the stable, although it may occur in animals which have bred. The chief clinical symptoms must clearly be referred to somatic and psychic changes in the patient. The somatic are exemplified by such alterations as abnormal libido; the animal appears to be in continuous œstrual excitement, and, especially in the cow, when the condition is in existence for some time, there follow changes in the body structure, specially noted in the pelvic and lumbo-sacral region. Here the alterations observed are a relaxation and sinking in of the sacro-sciatic ligaments; the inter-osseous ligaments between the sacrum and ilium, as well as the lumbo-

sacral articulation, partake of this relaxation, so that the caudal end of the sacrum becomes elevated and its lumbar end depressed, the external angle of the ilium becomes depressed and the tuber ischii elevated. On account of the relaxation of the sacro-iliac articulation the animal walks with a rolling gait and a grating noise can be heard between the sacrum and ilium when the animal moves. If the condition continues a very common sequel is fracture of some of the bones of the pelvic girdle.

The psychic changes consist of the very often pronounced form of mania present, as a patient which was ordinarily docile, gentle and well behaved now becomes vicious, nervous and often intractable. If a cow, this excitement may manifest itself by a more or less continuous bellowing; the animal will not remain quiet for any time, and, if in the house, she is inclined to climb the walls or get on to low partitions. If the patient is a mare, the disposition may be totally changed, as an animal normally docile and gentle may now have become vicious, ill-tempered and dangerous to herself, other animals and man, and may have become useless for any kind of work; or the reverse may happen—a normally vicious, excitable animal may become docile and phlegmatic. However, this latter condition is more the exception than the rule.

Before proceeding to discuss the etiology of this disease it is better first to discuss the various endocrine glands in their normal stability, the instability of which gives rise to changes responsible for nymphomania. The following glands may be implicated in the production of the pathologic changes which, combined, give rise to this condition:

THYROID.

These glands are the great activators of all the other endocrine structures. The secretion of the thyroid is an iodised albuminoid, the iodine being acquired by selective absorption, which modifies the activity of distant organs (hormone). By increasing normal function it affects the metabolic processes, cardiac activity, some portions of the sympathetic system, the hypophysis, and the suprarenals. Instances of its activity are the promotion of skeletal growth and the development of the sex glands. It also inhibits function. The limitation of the internal secretory function of the pancreas is an evidence of its inhibitory power (Bandler). Removal or hypofunction of the thyroid is followed by enlargement of the glandular portion of the hypophysis, there is general apathy and torpor, imperfect activity of the sex glands, to be followed by emaciation and cachexia. There is a very close relationship between the thyroid, ovaries, and uterus.

In hyperfunction of the thyroid there is a continuous over-secretion, and if the body is unable to neutralise or destroy it, then toxic annoy-

ances of various degrees will occur, such as increased cerebral excitement and increased heart action. Hypersecretion of the thyroid influences the activity of those other internal secretory organs which have functional interrelationship with the thyroid (thymus, hypophysis, ovaries, and suprarenals). At the adolescent period there is an increased activity of the thyroid. Instability of the thyroid is frequently brought about by bacterial infections. This gland produces two hormones, one by the interstitial part and the other by the follicular part. Hyperthyroidism is frequently associated with diminished normal ovarian function, but the reverse may occur; hypothyroidism is generally associated with increased ovarian function, therefore we see there is an interdependence between thyroid and ovaries.

PARATHYROIDS.

The parathyroids are intimately connected with calcium metabolism. Removal or hypofunction of these glands causes tetany, due to an abnormal decrease in the calcium content of the tissues. Parathyroid insufficiency is also responsible for osteo-malacia, also such a condition as myasthenia gravis, therefore the parathyroids have much to do with the absorption and excretion of the mineral salts of the body and are important to the nervous system and bone.

Interference with their normal function causes a decreased resistance to infection. In some cases the action of the parathyroids is antagonistic to that of the thyroids. The normal stability of the parathyroids may be easily changed by any of the infectious diseases.

HYPOPHYSIS.

The hypophysis appears, from modern investigations, to play a part in the animal economy which is of great importance in the way of skeletal growth, genital development, mental development, and sugar tolerance. It produces, by its oversecretion or undersecretion, most prominent and lasting changes in the bony structures of the body, and influences to a decided degree the mental and nervous make-up of the individual. The hypophysis is composed of three parts—the anterior pituitary, posterior pituitary and pons inter media. The anterior part of the gland is concerned with bony growth; the posterior lobe has a decidedly close relation to development and preservation of the genitalia.

In early life, and before adolescence, anomalies of the hypophysis, as a rule, cause failure of the development of the ovaries, of the uterus, and of other structures characteristic of the female (Bandler). After adolescence, anomalies of the hypophysis result in atrophy of the genitalia.

Changes in the secretion of the hypophysis are associated with

alterations in other gland functions. The relationship of the hypophysis to the adrenals, the pancreas, the thyroid, etc., is very close, but not so intimate as with the ovaries. The relationship of this gland to the mind is also very close, for various forms of hypophysis disease may produce nervous annoyances and psychic manifestations in varying degrees.

Infectious diseases, intoxications, diseases of other glands, and pregnancy, produce structural or functional alterations in the hypophysis as they do in other endocrine glands. During pregnancy there is an enlargement of the anterior pituitary, which enlargement persists. The anterior pituitary lobe is intimately connected with the production of male characteristics, while the posterior lobe is closely connected with the production of female characteristics. There is a close connection between the posterior pituitary, ovaries, and uterus, inasmuch as each is trophically supported by the other. The posterior lobe secretes a hormone (pituitrin), which acts specifically upon the uterus, causing contractions of its smooth muscle fibres, and this secretion is closely connected with the phenomena of labour and menstruations; therefore, at these periods there is an increased action of the posterior pituitary, thereby causing more violent contractions of the uterine muscles. At these periods the inhibitory action on the posterior pituitary of the corpus luteum is removed. During pregnancy the posterior hypophysis is responsible for the continuous auto-massage which normally takes place in the uterine muscle fibres. If this massage is absent, due to hypofunction of the posterior pituitary, we get a thin-walled paretic uterus, and at parturition it frequently gives rise to dystokia, or rupture of the uterine wall may occur.

Hypofunction of the posterior hypophysis, in the pre-adolescent stage, gives rise to undeveloped genital organs; in the post-adolescent stage to atrophy of these organs, with a slow pulse, low blood pressure, an increased sugar tolerance, therefore a disposition to adiposity. In hyperfunction we get an increased pulse rate, high blood pressure, cerebral excitement, and often abnormal sexual excitement. This latter feature is due to the specific action on the ovaries and uterus, which organs it stimulates. Hyperpituitarism is generally associated with hypothyroidism.

Ovaries.

The ovaries produce internal secretions, probably of three different varieties. Thus we have a secretion of the interstitial tissue, the action of which may in part be responsible for the growth and development of the female characteristics in the pre-adolescent period of life, the follicular fluid, and the corpus luteum secretion.

In all cases where there has been complete removal or complete degeneration of the ovaries, atrophy of the mammary glands and genitalia were found. It has been proved (Knauer) that the preservation to the organism of the functionating ovaries preserved the mammæ, the genital organs, and the sexual instincts. This result occurs through the absorption into the circulation of ovarian secretion.

The trophic function which the ovaries exert upon the body stand in closest relationship to their ability to form ripe ova. Ovarian tissue which has ceased to develop ripe ova has lost its secretory function. When the ovaries begin to produce the accepted adult type of secretion the result is made apparent by the onset of œstrum and menstruation. These glands are responsible for the proper development and nutrition of the internal and external genitalia. Their main protective influence is exerted on the uterus, and more particularly upon its lining, the endometrium. Infectious diseases which produce changes in the ovaries may also result in changes in the uterus ; likewise infections which produce alterations in the uterus may react on the ovaries and give rise to serious changes in those organs. The corpus luteum has an inhibitory action on the posterior pituitary, and, through it, on the functionating ovaries, and has a stimulating effect on the thyroid. All the elements of the ovary, with the exception of the corpus luteum, promote uterine hyperæmia and hyperæmia of the external genitals.

The ovarian interstitial and follicular secretions are responsible for œstrum and menstruation in the following manner :—They have a constitutional action on various mucous and serous membranes of the body, but have a special cumulative, selective, periodic, congestive influence upon the uterus, whereby the uterine walls become filled with blood, the capillaries become dilated, the endometrium is stimulated to hyperplasia, becoming thicker and turgid, so that the uterus, and particularly its lining, becomes a nest ready for any ovum which may settle within its cavity. Should no fecundated ovum settle there diapedisis and rhexis take place, the uterus contracts, and the characteristic menstruous discharge is expelled through the vagina. Ovarian secretion dilates the cerebral vessels, and excessive function of the ovaries increases the output of calcium from the body tissues. There is an intimate relation between the ovaries and the endometrium, inasmuch as the ovaries stimulate the endometrium and *vice versa*.

Endometrium.

It is now known that the endometrium forms an internal secretion which has a stimulating effect on the ovaries, especially upon follicular formation. This secretion also acts on the corpus luteum, causing

its regression prior to œstrum. Should the endometrium be destroyed by either disease or through excessive currettage, regressive changes occur in the ovaries, which are finally followed by suspension of œstrum and menstruation. Hyperactivity of the endometrium causes hyperfunction of the ovaries, of the posterior pituitary, and hypothyroidism. From the foregoing facts it can be seen there is a very intimate reaction between the glands of the endocrine system and that instability of one gland may produce unstable conditions in all or several of the others.

Now let us see what relation the instability of one or more of the different glands just described bears to the production of symptoms which collectively are known as nymphomania. It is now fairly evident that the endocrine system is the great alchemist which converts organic and inorganic substances into stable colloidal products, which are necessary for the normal physiological requirements of the body. It is these stable colloidal substances which, combined, form the foundation on which the immunity of the animal's body to disease rests. Any instability of one or more of the endocrine glands is liable to upset the others, and this upset may so alter the normal physiological action of the fluids and tissues that the normal immunity is lowered, infection gains entrance and sets up pathological changes in one or more of the different organs of the body.

Heredity seems to be closely related to the endocrine make-up, and it is in animals which are more or less in-bred that we see most examples of irregularities due to endocrine instabilities. While discussing the symptoms of nymphomania we saw that, especially in cows, it is very liable to appear in pedigree animals which have had an abortion, difficult parturition, or any condition from which the animal may suffer, whereby infection gains extrance to the system, and more particularly to that organ the uterus. This infection is then liable to cause unstable conditions in any of the endocrine glands, whereby their normal stability is changed, and we get either hyperfunction or hypofunction of the particular gland or glands affected.

In nymphomania the most common primary lesion is endometritis, the pathologic changes being hyperæmia and hyperplasia of the cells of the endometrium. This hyperplasia produces a hypersecretion of the endometral hormone, which reacts on the ovaries, producing an overstimulation of these organs ; these latter, through their hormones, react on the posterior pituitary and thyroids. In the former the reaction is always the production of hyperpituitarism ; in the latter the production of either hypo or hyperthyroidism. Under normal stable conditions of the endocrine chain we know that in animals which have reached the period of adolescence, at œstrum the

ripened follice in the ovary bursts, and an ovum, together with the liquor folliculi, is thrown out ; the cavity left in the ovary after rupture of the follicle is soon filled with lutein cells, which are the forerunners of the corpus luteum. The hormone produced by the new corpus luteum then inhibits the action of the posterior pituitary and endometrium secretions. This inhibitory effect normally lasts in the non-pregnant cow for 18 to 20 days. By this time a follicle in the other ovary has ripened and the endometrial secretion overcomes the corpus luteum, causes its rapid regression, thereby allowing the posterior pituitary to come into force. If the ovary is functioning properly the ripened follice bursts, and the phenomenon of œstrum and menstruation is repeated. Now, however, when the endometrium is hyperfunctionating, the normal process of the œstral cycle does not take place. Instead, we find that the ovary does not form the normal ripe follicle, which ruptures at about the 18th or 20th day, but forms numerous atrophic follicles, none of which mature, but undergo cystic degeneration, therefore there is no formation of new corpora lutea. While this abnormal phenomenon is in progress there is no inhibitory effect on the endomitrium and hypophysis, the result being that the genital organs are in a constant state of hyperæmia and sexual excitement.

Excessive action of the posterior pituitary, with hyperactivity of the ovaries, are factors which constantly give rise to the cerebral excitement commonly known as hysterical mania. Hypothyroidism with hyperpituitarism may have the opposite effect ; that is, we get depression, torpor and a phlegmatic disposition. Here, then, we may have an explanation of the various psychic phenomena occurring in nymphomania. We must next turn our attention and look for an explanation of the cause of the changes taking place in the bony structures of the body, especially those seen in the pelvic framework. We know that in hyperfunction of the ovaries there is a vastly increased calcium output from the body ; so much so, that the condition known as osteo-malacia may occur.

We also know that the parathyroids are chiefly responsible for calcium metabolism, and that these glands are easily influenced by changes in other glands of the same system. Therefore, if the parathyroids have their normal powers reduced the result will be a decrease in the calcium content of the body below its normal physiological requirements. Such a condition is also responsible for osteo-malacia, and for a grave decrease in the resistance to infection. It is a fact that in nymphomania, when the disease is some time in existence, the normal calcium content of the body is lowered.

Here, then, is a possible explanation of the alterations in the bony

and ligamentous structures of the pelvis. The normal rigidity of the bones is decreased, the result being they tend to bend, thereby decreasing the normal tension of their ligamentous connections. The weight of the abdominal contents tends to draw the brim of the pelvis downwards and forwards, at the same time elevating its posterior superior angle and depressing its anterior superior one. At the same time there is a loosening of the sacro-iliac attachment, the result being the animal walks with a rolling gait. It is due to rarefaction of the bones that part of the pelvic girdle is so liable to fracture.

Regarding the treatment of nymphomania, it has been the common practice in most countries to remove the ovaries, and in most cases this procedure was followed with very excellent results. However, this method could only be applied to cases where the animals were not required for stud purposes, as in mares kept for other purposes than breeding. In some cases the conditions were not removed by ovariotomy, and in such cases the failure can be referred to the fact that removal of the ovaries did not remove the instability of the hypophysis, thyroid and adrenals, which, in cases of this kind, are also probably implicated ; hence the failure to respond to ovariotomy. Williams, in his book " Diseases of the Genital Organs of Animals," discusses nymphomania, and he considers cystic ovaries responsible for the condition, but associated with the cystic condition of ovaries he also finds a metritis or endometritis. These latter conditions he regards as secondary to the lesions in the ovaries. He therefore advocates treatment of the ovaries by pressing out the unruptured cystic follicles as they appear, of much more importance than treatment of the uterine lesions. Again, Danish veterinarians consider it of much more importance to treat the uterine lesions than the ovarian, and Albrechtsen and others find the majority of cases respond to this method.

Reviewing the various factors responsible for this disease, it is perfectly obvious that the proper procedure to adopt is to treat the pathologic lesions in the uterus, and at the same time endeavour to administer extracts of the various glands, which act antagonistically to the glands, the instability of which is responsible for the production of the somatic and psychic changes seen in nymphomania. By the adoption of this mode of treatment I have had very excellent results.

The following are a few cases copied from my clinical case book showing the results obtained from the above method of treatment. All the animals, with exception of the mare, were pedigree stock, but for obvious reasons I have substituted numbers for their names :—

CASE I.

Name or herd number of animal.—55.

Date of birth.—February, 1916. Breed of animal.—Shorthorn.

Has animal been pregnant?—Yes.

If she has bred, state number of calves produced.—Three.

Date of termination of last pregnancy.—April, 1921.

Duration of last pregnancy in days.—260.

Was calf alive or dead?—Alive, but died soon after birth.

If living, was it healthy?

Did animal have retained placenta or discharge from uterus?—Both.

Character of œstrum, regular or irregular.—Very irregular, with extreme excitement.

General condition.—Debilitated. Pelvic ligaments relaxed.

State of lactation.—Very little milk given.

Date of examination.—November, 1921.

Right brood ligament.—Normal. Left brood ligament.—Normal

Vulva.—Hyperæmic. Vagina.—Hyperæmic.

Cervix.—Inflamed. Uterus.—Flaccid and sub-involuted.

Right ovary.—Contains numerous cysts. Perceptible corpora lutea absent.

Right oviduct.—Apparently normal.

Left ovary.—Same as right. Left oviduct.—Apparently normal.

Diagnosis.—Cervicitis, metritis and nymphomania.

Prognosis.—Fairly hopeful.

Treatment applied.—Intra-uterine douches of 2 per cent. Lugos Solution of Iodine. Cervix treated with pure Lugos solution, alternating with colloidal silver. Above applied once a week for five weeks, when douches of Lugos were discontinued and normal saline douches substituted. These latter were continued every third day for a fortnight.

Remarks.—The endometritis and cervicitis have responded to above treatment so far as a clinical examination can determine.

Progress of Treatment.—The sexual excitement still persists, and mania symptoms show no improvement. Cysts still present in ovary and appear rapidly after rupture.

Result of Treatment.—Some treatment still continued at intervals of eight days, together with endocrine therapy. Thyroid corpus luteum and placental extract given twice daily.

Combined treatment commenced.—February 10, 1922.

February 20, 1922.—Sexual excitement gradually disappearing and less ovarian cysts reappearing after rupture.

February 26, 1922.—All cysts remaining in ovaries pressed out.

March 10, 1922.—Has not shown œstrum since February 23.

March 30, 1922.—Animal in œstrum, which appeared normal.

April 20, 1922.—Animal again in œstrum ; apparently normal.

May 22, 1922.—Animal in œstrum and put to breed. Pelvic deformity has disappeared and owner considers animal pregnant and perfectly normal again.

CASE II.

Name or herd number of animal.—16.

Date of birth.—April, 1915. Breed of animal.—Jersey.

Has animal been pregnant ?—Yes.

If she has bred, state number of calves produced.—Three.

Date of termination of last pregnancy.—February, 1921.

Duration of last pregnancy in days.—192.

Was calf alive or dead ?—Dead.

Did cow retain placenta or have discharge from uterus ?—Discharge from uterus.

Character of œstrum, regular or irregular ?—Irregular, occurring every sixth or eighth day, continuing for three to five days. Abnormal excitement also present.

General condition.—Fairly good.

State of lactation.—About half normal quantity.

Date of examination.—September, 1921.

Right broad ligament.—Normal.

Left brood ligament.—Normal.

Vulva.—Hyperæmic. Vagina.—Hyperæmic. Slight discharge.

Cervix.—apparently normal ; discharge from os.

Uterus.—Sub-involuted.

Right ovary.—Cystic. Right oviduct.—Normal.

Left ovary.—Cystic. Left oviduct.—Normal.

Diagnosis.—Endometritis and nymphomania.

Prognosis.—Hopeful.

Treatment Applied.—September 12, 1921 : Uterine douches same as in Case I, commenced and continued for one month. By this time uterine discharge has ceased and uterus shows much more firmness and tone. Sexual excitement still continues. October 15, 1921 : Endocrine therapy employed ; douches still to continue. Examination of pulse shows it abnormally fast and varying from 65—75 per minute. This indicates hyperthyroidism, therefore thyroid extract contra indicated. Give corpus luteum extract, mammary and placental extracts twice daily. October 22, 1921 : Animal much quieter. Last œstrum lasted about 30 hours, ending October 20. October 30, 1921 : Œstrum has not again appeared. Animal appears normal. November 20, 1921 : Animal remains normal. Œstrum has not

appeared since October 20. November 25, 1921 : Œstrum occurred, lasting 23 hours. No undue excitement. November 28, 1921 : Cow examined. Ovaries have lost their numerous cysts. Right ovary contains crater of ruptured follice of œstrum just passed. Uterus normal in tone. Discharge from os ceased. Hyperæmia of vulva and vagina has disappeared. If next œstrum occurs at normal period animal is to be bred. December 16, 1921 : Œstrum is present. Cow bred.

Remarks.—This cow held to service on December 16, and the owner now informs me she is heavy with calf and is perfectly healthy.

CASE III.

Name or herd number of animal.—Three-quarter bred hunter mare.

Date of birth.—1914.

Has animal been pregnant ?—No. Sent to stud in 1917, but did not breed.

General condition.—Fairly good. Animal showing all the symptoms of nymphomania.

History.—Symptoms of the disease appeared in end of 1918. Some time in 1919 the owner had her castrated, as she was becoming unmanageable. For some time after ovariotomy the mare appeared normal, but the symptoms gradually returned, so that by the autumn of 1920 animal was worse than before the ovaries were removed. In the spring of 1921 I by chance met the owner, when he informed me of the animal's condition. I asked to be allowed to examine her, to which he readily assented.

Result of examination, which was made on March 10, 1921 :—

Right brood ligament.—Normal.

Left brood ligament.—Normal.

Vulva.—Hyperæmic. Vagina.—Hyperæmic.

Cervix.—Inflamed and dilated ; discharge from external os.

Right ovary.—Absent. Uterus.—Enlarged, flaccid.

Right oviduct.—All that remained was thickened.

Left ovary.—Absent. Left oviduct.—Same as right one.

Diagnosis.—Metritis and cervicitis, with nymphomania and hyperthyroidism, on account of increased pulse rate and hyperæmia of visible mucous membranes.

Prognosis.—Bad.

Treatment Applied.—Uterine douches of Lugos iodine every third day. Endocrine therapy employed, consisting of anterior pituitary extract, thymus extract, corpus luteum and placental extracts, given twice daily, together with calcium lactate ʒii b.i.d. After a fortnight's treatment the douches were only given once weekly. Without further describing the course of treatment which was continued

for five weeks, and then for a week at intervals of three weeks, in all, the treatment extended over three months, by which time all symptoms had disappeared, the mare was perfectly normal, and has remained so since. Mare hunted all through last season, giving entire satisfaction.

This last case is one which is a very good example of the splendid results to be obtained from the proper selection and use of the various gland extracts in conditions of genital derangements as are exemplified by psychic disturbances and are brought about by the histobility of one or more of the various glands of the endocrine system.

A THEORETICAL STUDY OF THE NATURE OF ULTRAMICROSCOPIC VIRUSES.

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THE ultramicroscopic or filter-passing viruses form a very important group which in more recent years has received a good deal of attention. Our knowledge, however, of this group is very limited: not only is this so, but as no one has succeeded in proving that he has seen or grown a single variety, it is well to admit that we cannot be certain as to what constitutes such a virus. I have already discussed shortly many theoretical possibilities as to their nature in my past papers on the ultramicroscopic viruses, on the filter-passing lysins associated with bacterial cultures, and on the special large forms with their associated free granules which I isolated from pure cultures of dysentery and other bacilli. I propose now to consider these together and in more detail, and to add other points which may not have been brought out in my previous papers.

It is, of course, possible that the ultramicroscopic or filter-passing group as defined at the present day may include a number of quite distinct forms of life. In any case, the limits of the group are very indefinite, and it seems doubtful if such an organism as the leptospirillum of yellow-fever should be placed in the same group as the viruses of measles, scarlet-fever, and similar diseases. Some at least of the filter-passing viruses at present included in the group may be of the nature of a minute bacterium that will grow only on living material, or, on the other hand, a tiny amœba which, like ordinary amœba, thrives on living bacteria or animal tissue, or on some form of life that is still lower in the scale of evolution.

The infective agent of yellow-fever is known to pass a porcelain filter, and Noguchi has obtained from the pathological material of patients a leptospirillum which is believed to be the causative agent.

If these are accepted as facts, the filter-passing virus of this disease at least is a definite organism belonging to one of the groups already known. Yellow-fever, however, has certain characters which appear to separate it from most other diseases caused by a filter-passing virus, and it does not follow that the majority of these diseases are caused by an organism of the same group. In 1914 I cultivated a spirochæte from a mouse on the surface of an egg medium containing an " Essential Substance," and in fluid cultures this spirochæte passed a Berkefeld filter with ease, while more recently I have obtained a number of cultures of delicate vibrio-spirilla from soil. Although all these organisms passed a filter, I have never classified them as true ultramicroscopic viruses, and it seems improbable that the viruses causing the exanthematous diseases are of a similar nature. The spirochæte from the mouse varied considerably in size according to the exact composition of the culture medium used, growing in round and crescent forms in older cultures, and being very minute in fluid media. One cannot indeed exclude the possibility that an ultramicroscopic virus may belong to this group, or may be a minute or special form, or a stage in the life history, of some micro-organism belonging to this or some other known group.

In this connection it is worthy of note that in my experiments on dysentery bacilli I was able to grow and isolate a number of special large forms. Some of these were associated with a considerable number of definite free granules which appeared to arise from globular and fusiform swellings in the bacilli. The granules, however, were never cultivated apart from the bacilli, and I was unable to obtain any evidence that they represented a filter-passing stage in the life-history of the bacillus.

If it is assumed that yellow fever and possibly one or two other diseases belong to a separate class, then in the case of the ultramicroscopic viruses pathogenicity is the only real evidence of their existence, so that a non-pathogenic member of the group would pass unobserved in nature. We know, however, in the case of ordinary bacteria that for every pathogenic variety many non-pathogenic forms of the same type exist, and it seems reasonable to conclude that the same rule will be found to apply in the case of the ultramicroscopic viruses, unless these have no separate existence apart from the host they infect.

With bacteria, the wild varieties are usually easy to grow, and one would expect a wild variety of the ultramicroscopic viruses to be easier to cultivate than a pathogenic variety. Yet it is a curious fact, worthy of special note, that no worker has ever succeeded in obtaining a growth on artificial solid media of a single wild variety of this pre-

sumably huge group of viruses. I may note also that I have made many thousands of cultivations from filtrates of soil and water, and from decomposing vegetable and animal tissues on hundreds of different media, and under many conditions, but I have never succeeded in obtaining a growth that I could prove was an ultramicroscopic virus. The delicate and minute vibrio-spirilla which were cultivated from soil pass a Berkefeld filter it is true, but that is scarcely sufficient to justify one in classifying them as ultramicroscopic viruses. It is possible, of course, that some very special condition or substance is necessary for the cultivation of these viruses, but anything so special as to be essential for every member of the group would certainly point to a fundamental difference in their nature. The view that they are very minute varieties of ordinary bacteria will not pass a critical analysis. Minuteness of size might account for their being invisible under the microscope, but it will not explain the difference in cell reaction nor the high degree of immunity produced in the animal host. Moreover, the fact that the pathogenic varieties will tolerate concentrated glycerine for a considerable period, and other facts which we know regarding them, do not point to their being very delicate, and do not support the view that they are closely related to ordinary bacteria.

From these considerations it would appear advantageous, before carrying out further experiments on their cultivation, etc., to put aside for a time the generally accepted view that they are simply very minute bacteria, and to consider other possibilities that may present themselves when the subject is studied from a theoretical standpoint.

In a broad survey of this subject, it should be remembered that if the living organic world has been built up slowly in accordance with the theories of evolution, then an amœba and a bacterium must be regarded as highly developed organisms in comparison with much more primitive forms which once existed, and probably still exist, in Nature. From the standpoint of evolution it is almost inconceivable that life should have started suddenly as a bacterium or as an amœba ; in which case life with a lower organisation, or precellular life, must have once existed. As it seems highly improbable that the whole of this life should have died out, it appears reasonable to assume that it still exists in many forms at the present day. If this is accepted as a probability it is not unreasonable to conclude that some of these forms of life may cause disease in the higher forms—or even in the lower ones, such as bacteria—and ultramicroscopic viruses may be the representatives of these forms of life.

It will be profitable now to take note of the stages whereby the

higher animals and plants have been evolved from the lower ones, as it is almost certain that the rules that have governed the evolution of these are the same as those that directed the evolution of the single cell organism from more primitive life. Broadly speaking, we may say that the higher animals differ from the unicellular ones in that the original fertilised cell has divided, not to form another individual, but to remain in association to form a larger individual; and in so doing has not divided its inherent characters evenly between the cells, but has passed some of its characters to one cell and some to another, thus producing specialised cells for the carrying out of the different functions of life, there being produced at the same time a covering of cells which protects the whole structure and defines the limits of the individual.

If this is the essential difference between an amœba and one of the higher animals, it seems probable that the difference that separates precellular life from that of a unicellular organism is of the same fundamental nature. After all, an amœba has a highly complex structure, and even in the case of bacteria, where development may not have advanced far enough to evolve a definite nucleus from the nuclear elements which are undoubtedly present, there is, nevertheless, a considerable amount of specialisation. If, then, the same rules have governed development since the origin of life, one can assume that the cell has been evolved from a living protoplasmic molecule which at one stage of its development would be covered by a kind of membrane to form definite individuals. Normally this would divide by division to form fresh individuals, but in the process of evolution these would divide so as to pass some character to one molecule and some to another, the molecules remaining together to form a larger individual, and the whole being covered by a membrane—or concentration of protoplasm—to protect and define its limits, such primitive life passing up by an almost infinite number of stages to what is known as a cell. In other words, it may be that there is in existence a primitive living protoplasmic molecule, and this may bear the same relation to the collection of differentiated molecules forming a cell as a primitive cell does to the collection of differentiated cells forming an animal. It should be noted that throughout this paper the word "molecule" is used in a broad biological sense to denote a primitive unit of life, and not in the strict chemical manner, although this might be justified. If the same arguments are applied, it would be easy to map out forms of life of a still more primitive nature, gradually getting back to the chemical reactions, and even into the realms of metaphysics, but this would be passing to a more primitive state than that which appears to be represented by the ultramicroscopic viruses.

The essential point is that if all life has been built up in accordance with the laws of evolution, then precellular forms must exist, and unless life on this earth was first introduced in the form of a living cell from another part of the universe, then the precellular forms must be present on this earth. On every ground one would expect such forms of life to possess the same fundamental physiological and biological activities as those shown by a unicellular organism. In any case in those forms of life immediately below that of a cell it is almost certain that enzyme action would be one manifestation of their activity. Broadly considered, from a theoretical standpoint, there appears to be no argument against the possibility that some at least of the ultramicroscopic viruses may be representatives of precellular forms of life, being pathogenic to the cell in the same way that an amœba may be pathogenic to an animal.

There is, however, another possibility which deserves some consideration. We know that one organism can live at the expense of another, causing disease in the host. A unicellular amœba can live on a specialised multicellular animal, and if we look upon cancer as a case where one cell of a multicellular organism takes the place of an amœba and lives as a separate organism at the expense of the remaining cells forming the animal being—and suggestions of this kind have been made by many workers—then it does not appear unreasonable to consider the cancer cell as a reversion or partial reversion to its remote ancestral state of a unicellular organisation. Or in the early divisions of the fertilised cell it may be that certain cells never developed or specialised beyond the stage of a separate existence : in other words, that they retained many of the essential functions of independent life. In either case the cell would be more primitive, but more complete biologically, and might act as a parasite to the organisation formed by the remaining cells. If, however, either of these actions may occur with one cell of a multicellular organism, it is equally possible that either action may occur with one molecule of a multimolecular specialised organisation known as a cell, and such a molecule taking on the life of a separate individual might be revealed to us as an ultramicroscopic virus. It is even possible that the cancer cell itself is formed through a partial reversion of one or more of its protoplasmic molecules to the independent life of its unimolecular precellular ancestor. Or cancer may be due to an irregular development or to the death of one or more of the specialised molecules of the cell which upsets the equilibrium of its functions ; but to consider all the possible causes of cancer would be outside the scope of this paper.

It is probably correct to say that it is only those cells which incor-

porate all the functions of life—that is, which contain all the specialised protoplasmic molecules built up from the primitive unimolecular unit of life—which are really complete structures of cell life, and are capable of continuing life indefinitely. As soon as we get division of cells with uneven distribution of these functions, or, in other words, specialisation, then these cells cease to remain complete living structures, and die after functioning for a period of time which must be considered infinitely short in relation to the infinity of time. It is, in fact, only the sexual cells, after fertilisation, which retain the essential molecules for all the vital functions, and which perpetuate life in an animal. If this is true of the cell, it must be equally true of the precellular molecule of life, and for this to live and multiply indefinitely it must be a complete or non-specialised molecule. One might almost look upon the molecules of the sexual cells, which are destined to be extruded as polar bodies, as bearing the same relation to the remaining molecules of those cells as do the specialised cells of a multicellular animal to the sexual cells of the animal.

If all the differentiated molecules of a cell have arisen from some complete molecule of life it might be possible for some of the differentiated molecules through some biological error to be given more of the functions of life than would be consistent with its remaining a co-ordinating molecule of the cell. Such a molecule would be more primitive, but more complete, and might to an extent live as a separate precellular being, and might function in the manner of an ultramicroscopic virus. In this case one might expect the virus to live and multiply in the host—possibly cell host—from which it arose, and if this first took place in some remote age it might, in passing from host to host, gain in virulence and take on a sufficiently independent life to infect similar cells in other species of hosts. It might even be induced to increase for a short period outside the animal body in somewhat the same manner that connective tissue and other cells may be stimulated to multiply in certain sterile fluids. It would, however, be unlikely to be sufficiently abnormal and complete to be capable of an absolutely independent existence.

Another possible explanation is that a cell under some stimulus will produce a special molecule containing or consisting of an enzyme, or possessing some other normal function necessary for the living being. If this were a continuous process the presence of the molecule might stimulate the cell to produce more of the same substance, and so on, until some other factor stopped its formation. If such a function, either under the laws of variation, or through some external adverse condition or agency, became abnormal and pathological in its action, it might pass beyond the control of the cell. If, however, it retained

its power of stimulating the cell to produce further quantities of an identical substance, then the cell under its stimulation would produce the abnormal pathological material until its toxic action caused the cell or other cells of the animal body to react against it. A virus, if started in this way, would be capable of being transmitted to a fresh host of the same species or variety, and in its passage through many hosts it might continue to vary and become more pathological in its action, and might even acquire the power of carrying on its pathological action in another species of host. Further, under such a hypothesis, diseases might start *de novo* at any time, and, besides arising in animals and plants, a virus, if of this nature, might, in a similar manner, be formed in such organisms as amœbæ and bacteria.

This may appear improbable, but the possibility cannot be altogether excluded. In my paper on the ultramicroscopic viruses, which was published in the *Lancet*, December 4, 1915, I showed that many bacteria may have in association a filter-passing lytic material which dissolves up the bacteria of the culture, and, moreover, can be carried to fresh cultures of the same variety of bacillus for an indefinite number of generations. This lytic substance has but little effect on another species or variety, although recent workers claim to have acclimatised such lysine to act on different varieties of bacteria to those with which it was originally in association. I cannot here enter into all the details of my experiments, but it is important to note that pure cultures, after repeated plating out, were found at times to produce apparently *de novo* this lytic substance, and this when once obtained could again be transmitted through an indefinite number of growths of the micro-organism, causing these to become dissolved into granules. In this case, unless the cultures were never absolutely free from the lytic material, or unless it is assumed that it had been reintroduced into the pure cultures from the air passing through the cotton wool plugs of the tubes, then this lytic substance must have been produced by the bacterial culture. D'Herelle, who has since carried out many experiments on these lytic substances, supports the view that they are ultramicroscopic viruses. On the other hand, Bordet and Ciuca, who have also carried out some very interesting experiments on the origin of the lytic material, do not agree with this view. These workers inoculated a pure culture of a coliform bacillus into the peritoneal cavity of an animal, and obtained a lysin which would act on fresh cultures of the bacillus. They found also that this lysin could be transmitted from culture to culture, and acted in the same manner as the lysin found in association with bacterial cultures. They conclude from this experiment that the lytic material is formed after an association of a bacterial culture with the body cells of an

animal. Since, however, I obtained an apparent spontaneous production of the lytic material by the bacterium, I do not consider that their experiment is definite proof of this view, although it certainly indicates that their lytic material is not of the nature of a very minute bacterium, unless the fluid containing the lysin got contaminated with such a minute organism from the intestinal tract or elsewhere. If, however, the view supported by d'Herelle and that of Bordet and Ciuca are both correct, then some at least of the ultramicroscopic viruses may arise as I have already indicated. In my original paper I discussed the possibility that these lytic substances might be ultramicroscopic viruses, but as the nature of such a virus is not settled, I did not commit myself to a definite decision, and as fundamentally the position has not changed in the interval, I am still unprepared to consider the question proved one way or the other.

Although the conclusions drawn from these experiments by various workers are often different, the experimental results are usually quite definite. They form, therefore, a most important centre around which to discuss the nature of an ultramicroscopic virus. It is usual in medicine to define an ultramicroscopic or filter-passing virus, and then to experiment to find out which diseases are caused by a member of the group. There is, however, no logical reason why one should not consider any disease that may be caused by a filter-passing substance which increases in the host as due to an ultramicroscopic virus, and then to make the definition of such a virus broad enough to include these filter-passing substances. In this case the lytic material would be classified as an ultramicroscopic virus, although it might not be closely allied to the filter-passing viruses of some other diseases.

The justification of this course will depend very largely upon the proved nature of such filter-passing viruses as are known. If in the end all these should be shown to be very minute bacteria, with possibly a few special characters, one would scarcely be justified in broadening the definition of the group in such a way as to include the lytic material found in association with bacterial cultures, unless ultimately this also should be proved to be an exceedingly minute bacterium. If, however, the known filter-passing viruses differ so widely from each other that while some are very minute bacteria, others belong to one or more of the theoretical forms of life already discussed, then the lytic material would fall into one of the several sub-groups into which the whole group would have to be divided.

Quite recently some interesting experiments which may have some bearing on the subject have been published by A. Fleming in the *Proceedings of the Royal Society*. This worker has isolated from the nasal secretion of a case of acute coryza a micrococcus, the growth of

which is inhibited by various body and other fluids. Cultures of the coccus are also dissolved or lysed by these fluids, and the lytic agent is active in very high dilutions. Fleming has named this substance "Lysozyme." He has found it chiefly in nasal mucous, sputum and tears, and to a less extent in other body fluids. Egg white is rich in the lysozyme, and it was also found in certain vegetables, notably the turnip. The lysozyme passed a porcelain filter after the filter had become saturated with the material, but it did not pass a collodion sac. It was not destroyed by precipitation by alcohol, or by drying, but after heating the fluids to 75° C. for five minutes no lytic power remained. The lysozyme was tested on a number of other micro-organisms, including members of the typhoid-coli group; but streptococci and staphylococci were the only others found to be susceptible. To what extent the lysozyme of Fleming is related to the transmissible lysins I discovered in associations with bacterial cultures it is difficult to say.

(*To be continued.*)

Clinical.

URETHRAL CALCULUS IN A HORSE.

By WM. LOTHIAN, M.R.C.V.S.,
Duns.

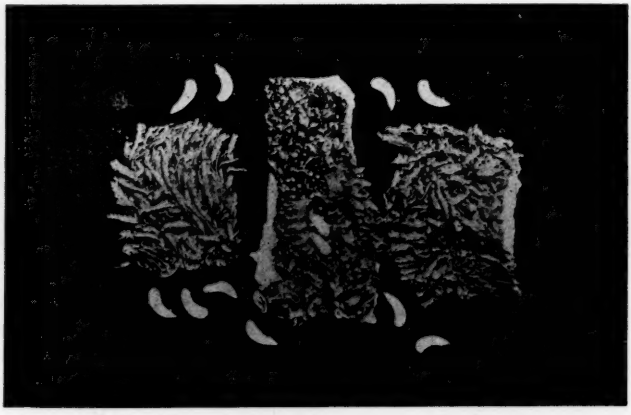
THE subject was an aged black gelding, used in carting on the estate. His driver had complained for some time that the animal was rather slow in urinating, and on this morning, not being able to pass anything, the horse was in considerable pain. On examination, bladder was found to be very much distended. The catheter was passed into the urethra, and came in contact with a hard substance about the middle of the pelvic symphysis, where a calculus could be felt. Having a rope with me, I had the horse cast and put on his back. In this position the calculus could not be felt until I cut through the skin and introduced my finger into the wound. I then cut down, slit the urethra, and removed the stone. Urine flowed freely through the opening. The after hæmorrhage was a little troublesome, and did not stop completely for about twelve hours, although never very much at a time. The wound was washed out thrice daily with salt and water, and in a week he was passing all the urine by the natural passage. To-day the stiffness and swelling are gone, and wound nearly healed.

The calculus weighed one ounce when fresh, and seemed large in size to have got so far down the urethra. The operation was performed on May 25 last, and there have been no complications to record.

PARAMPHISTOMUM CERVI (*ZEDER*) FROM A COW IN CHESHIRE.

By A. W. NOEL PILLERS, F.R.C.V.S., F.Z.S.

On January 4 this year I received from Mr. W. Kendrick, M.R.C.V.S., of Tarvin, near Chester, some trematodes, which, upon examination, turned out to belong to the above species (syn *Amphistomum conicum*). Although I have had numerous examples of this worm from the rumen of cattle abroad, this is the first time I have seen them from an animal in this country. This also is the experience of Mr. Kendrick in his district. The host was reported by him to be extremely emaciated, but without cough, diarrhœa or icterus. There were likewise no apparent glandular enlargements, and the



Paramphistomum cervi SHOWING FREE AND ATTACHED PARASITES, TOGETHER WITH POINTS OF ATTACHMENT ON THE MUCOUS MEMBRANE OF THE RUMEN (HALF NATURAL SIZE).

udder was normal. There was a certain amount of paralysis, but no flexion of the spine in the lumbar region under strong pressure. The temperature and pulse were normal, but there was a very poor appetite with chronic tympanites.

A provisional diagnosis of some wasting disease, possibly of a tubercular nature, and originating in the spinal column or stomach, was made. As the outlook was far from promising the owner was advised to have the beast slaughtered.

The post-mortem examination showed that the posterior mediastinal gland was very much enlarged and œdematous. The liver exhibited considerable piping and cirrhosis due to an old-standing

invasion of liver flukes. Externally over the region where the rumen and reticulum join there was marked thickening and a considerable amount of blood-stained exudate, both extremely suggestive of a swallowed foreign body. The parasites were present in hundreds in the rumen near its communication with the reticulum. They were in groups, attached by their broad ends, and in places somewhat obscured by the normal leafy outgrowths. When pulled away a small white papilla remained on the mucous membrane, indicating the point of attachment. In the spinal cord the meninges were hæmorrhagic, certain portions being black enough to suggest melanotic changes. In the spaces there was a yellowish exudate with white grain-like bodies in suspension. In no organ were any definite macroscopic lesions of tuberculosis detected.

I do not think I can add much to the above account save to say that *Paramphistomum cervi* must be very rare in this country, that it is usually regarded as having hardly any pathogenic powers, and that the life history appears to be unknown. In answer to a letter Mr. Kendrick forwarded me certain portions of the infested rumen. In the accompanying photograph two parasites may be seen adhering to the mucous membrane of the middle portion, a number are free, and all three pieces of the rumen show the points where parasites have recently been attached. The average length of the adult is from 10 to 13 mm.

POISONING OF CATTLE BY ARSENIC.

By G. A. M. HARLE, M.R.C.V.S.,
Coldstream.

On Friday, June 9, in the afternoon, I was called to a farm three miles distant to see a grazing bullock which had died suddenly in the field. The bullock was one of twenty which had been purchased about a fortnight previous. He was lying just beside the water-trough, and the man said he saw him there seemingly all right a short time before. Microscopic examination for anthrax was negative. It did not strike me as a case of anthrax, as there was neither hæmorrhage from nostrils or anus and no swelling. I told the man to bury the beast and left. In the morning early I got word from the police that three of the other bullocks were dead, and went at once. When I got there another bullock was ill, and died just after I arrived. The man said they just walked very slowly in a staggering fashion and lay down and died without a struggle.

Post-mortem revealed acute congestion of the paunch, reticulum and omasum, intense congestion of the abomasum, and catarrh of the duodenum. The deaths would be too rapid for much change.

but pointed to poisoning. An examination of the viscera found arsenic to be present in considerable quantity. (This examination was made by Prof. Gemmell, of the Royal (Dick) Veterinary College.)

In the corner of the field in which the bullocks were grazing was an old shallow trough through which sheep suffering from foot-rot were walked. It was boarded over, but it appears a part of the boarding had been broken off. It was replaced when I was there. The farmer told me this trough had not been used for nearly two years, but that the foot-rot mixture in it contained arsenic.

GANGRENE OF THE THIGH AND QUARTER MUSCLES AS A SEQUEL TO MILK FEVER.

By THOMAS WILSON, M.R.C.V.S.,
Nantwich.

The following cases are described to illustrate a sequel to milk fever in cattle, which I have noticed on quite a number of occasions, but in every case when it appeared it either terminated fatally or the beast had to be destroyed.

Case I.—A seven-year-old roan dairy cow, in very good condition, which developed milk fever about 24 hours after calving. Treated her in the usual way for milk fever by inflating the udder with air. About 10 hours afterwards the cow appeared to have recovered, was quite conscious, and ate a bran-mash readily, but was unable to get up.

I gave her a mild purgative drench of Sodii Sulph. 8 ozs. and P. Zing. 1 oz., in warm water, and added 1 lb. black treacle, followed by a powder twice daily containing P. Nux Vom. 1½drachm, Ammon. Carb. and Sodii Bicarb. ½ oz. and P. Gentian ½ oz. The next day the condition of the cow was no different. She took light laxative food freely, but was still unable to rise.

This treatment was continued until the fifth day after calving, when I saw the cow again. The muscles of both hind quarters were hard, the hocks swollen and rather painful, and she now refused her food. As I considered her chance of making a useful recovery small I advised slaughter, and this was carried out.

Autopsy revealed muscles of both hind quarters, from the hips to the hocks, to be very dark and almost black, with a considerable amount of gelatinous fluid between the muscles. Remainder of the carcase firm and apparently healthy.

Case II.—A roan dairy cow, which developed milk fever about 36 hours after having her seventh calf.

On arriving at the farm I found this cow to be only slightly affected with milk fever. She was able to get up when roused, but was very unsteady, and soon lay down again.

I inflated the udder and treated in the usual way for milk fever. This case being a mild one, and as I was able to treat her in the early stages of the disease, I quite expected the cow to be on her feet and all right again in a few hours time. I did not see her the following day, as the owner met me at a neighbouring farm and told me the cow was doing well and seemed perfectly healthy in every way, except that she could not get up, although she had made several good efforts to rise, but could not quite manage it. I gave the owner some stimulant and some powders containing Ammon. Carb., Nux Vomica, etc., to give her twice daily, and thought she would soon be on her feet again, as she turned herself from side to side and scrambled about the box herself.

A fortnight later I met the owner at a cattle market close to his farm, and he informed me that the cow was still unable to get up, although she appeared perfectly healthy and had never refused a feed since she recovered from the milk fever.

I called the same day and examined her again. When I first looked at her over the loose-box door she was lying in a perfectly natural condition, and chewing her cud as though nothing whatever was wrong with her. I examined the hind limbs and found a fœtid discharge from the inside of the off thigh. The skin was broken through at this part, and a further examination revealed the muscles of the thigh and quarter at this side to be quite gangrenous, very offensive, and void of any sensation ; in fact, the muscles from the hock to the hip were simply a " putrid pulp."

I considered the case hopeless, and the owner had her slaughtered and sent to the knackers.

Case III.—A six-year-old cross-bred shorthorn dairy cow, down with milk fever about 24 hours after calving. She was comatose and in advanced stage of milk fever. Treated in the usual way by inflating the udder with air. Next morning—*i.e.*, about 12 hours afterwards—she was quite conscious and apparently all right, excepting that she was unable to rise.

On examining the left hind leg I detected a hard, painful swelling in the gastrocnemius muscles, about 8 or 9 inches above the point of the hock.

As this is the usual starting place of this condition, and as I have not yet known a beast to do any good once it has set in, I advised immediate slaughter.

The cow was slaughtered the same day, and the following morning Mr. Tyerman (a Class D student) and I made a post-mortem examination on it.

The muscles at the back of the left hind limb, from the hock to the

hip, were very dark in colour, soft and flabby, with a considerable amount of a gelatinous exudate between them. The remainder of the carcase was well set and healthy in every way, and seemed quite fit for food.

Remarks.—My reason for describing these few cases is to illustrate a condition which I have met with as a sequel of milk fever on quite a number of occasions. In fact, I have come to the conclusion that of the small percentage of milk fever cases which do not make an absolute recovery, after inflating the udder and treating in the usual way, that a considerable percentage of these unfavourable cases—I should think at least 50 per cent.—are the result of this condition, which commences in the muscles of the hind limbs, usually the gastrocnemius to begin with. This condition appears to be the result of paralysis or degeneration of the nerve supply to the muscles at the back of the thigh, the muscular tissue then undergoing degenerative changes. Once this condition of these muscles have set in I have not had a case to do any good, and when I am satisfied that it exists, and the cow shows no inclination to rise, I advise immediate slaughter.

I should be very pleased to know the opinion of other practitioners who have had experience of this sequel of milk fever, and whether they have any satisfactory treatment for it—either prophylactic or curative.

SOME CLINICALS.

By J. G. HOBAN, M.R.C.V.S.,
Whitchurch.

I.—Abscess of the Liver in a Cow.

Subject.—A valuable pedigree roan shorthorn cow, the property of a gentleman farmer.

History.—Was found in a drain on July 26, and rather pulled about when being taken out. On August 2 it was walked 6½ miles to my yard for our local show next day. On arrival she lay down and refused food, whereas her companion ate greedily. However, she seemed quite all right in about an hour, so it was put down as fatigue.

I was first asked to see the animal on August 13. As I was away my locum attended, and diagnosed indigestion. Treacle, followed by Ammon. Carb., Nux Vom. and Sod. Bicarb., was given, and she seemed all right by the 16th. At this time the owner was away in Scotland, and not likely to return for some weeks.

August 31.—Asked to see cow again, as she seemed similarly affected. Found temperature normal, slight grunting, stiffness, loss of appetite and severe straining on passage of urine, which was scanty.

The animal seemed tucked up and afraid to move. Powders of Ammon. Carb., Nux Vom., Sod. Bicarb. and Zingib were given, and the patient improved, and seemed normal by September 5.

September 13.—Called again, as cow had a relapse. Found tympany, stiffness, and no fæces passed in previous 12 hours. Temperature normal, but little or no milk was given that morning. Gave 1 lb. Mag. Sulph., followed by Spirits Ammon. Aromat and Tinct. Nux Vom. Gradual improvement until the 16th, when apparently normal, though tympany occurred after food, but passed off.

September 28.—Asked to see cow once more. Severe tympany and purging, temperature 101·8, pronounced jugular pulse, and lungs seemed congested. The patient had rapidly lost flesh (which previously had been slight and gradual), and the back muscles seemed quite wasted. Powders of Sod. Bicarb., Carbo. Lig. and Zingib given, and an improvement set in and was maintained till October 1, when she again seemed normal.

October 15.—Called again. Told bowel action, appetite and milk supply had been most irregular. Found m.m.s yellowish and a slight swelling in the dewlap, though the jugular pulse was not so pronounced. Temperature 100·8. Fæces yellowish, though plenty urine passing, and no straining. Put on Acid Nitro-hydrochlor., and again seemed quite better on the 17th.

The owner returned on the 19th and was told it was only a question of time and a definite diagnosis of liver trouble given. Asked would he like a second opinion, and on the 20th another practitioner was called in. On his advice cow tested for T.B., but no reaction, and the opinion was—a new growth involving the liver. Animal put on Sodi Hyposulph., Arsenic and Artificial Karlsbad Salts, sufficient being left to last a week.

On seeing her in a week a decided improvement was noticed—a return to 15 lbs. of milk per meal, improved appetite, absence of grunting and tucked up appearance—so a continuation of same medicines advised. However, they were produced absolutely untouched, not one dose having been given! Owner decided that, as patient seemed better, he would keep off drugs and rely on nursing, with a request to see her periodically.

Seen when next visiting the farm some ten days later. No further loss of flesh, milking the same, appetite better, no icterus, lungs seemed normal, and, in fact, a vast improvement all round. Temperature still normal.

She was seen periodically until January 8. There had been a gradual improvement, though occasional attacks of constipation,

scour and tympany. Milk yield and appetite varied, but temperature never above 101·5. The icterus had not been noticed.

On the morning of January 8 'phoned for at 8 o'clock, as cow seemed dying. She had one of her attacks the previous evening, I was informed on arrival, when I found the animal dead. Post-mortem held on premises next day.

Result.—An enormous post-phrenic abscess, involving the liver and extending to the spleen, the whole area being filled with pus. It seemed as if one had pumped in melted butter under the abdominal muscles and allowed it to set. No trace of T.B. Lungs and heart normal to all appearances.

Remarks.—In this case there never was a high temperature, nor such that one was justified in diagnosing a suppurative condition. The almost complete absence of any constant symptom, with the possible exception of irregular bowel action.

Liver abscesses seem fairly common in this district, yet one never sees any tendency towards improvement, and it is a case of going from bad to worse until death or slaughter, but this cow seemed at one time on the high road to recovery, and that at the time she was having no medicines whatever. In fact, it seemed a case of " pouring medicines about which we know little into a body about which we know less."

II.—Milk Fever.

On the 16th inst. was called to a case of milk fever at a small holding, and on arrival found that another cow had also got it. The owner had five cows. Two of five down with milk fever at the same time ! Recovery uneventful.

III.—Rupture of Womb.

Was called on May 25 last year to an aged grey mare, found bad in the stable by the owner. She had been served the previous evening by a shire stallion. Taken to stable, given usual feed (which she ate), and made comfortable for the night.

On arrival I found the animal *in extremis*, and was told she had not " knocked about " until found by the owner. She died in an hour's time, and post-mortem revealed a ruptured vagina—on its upper surface just behind of os.

The owner of mare and the groom both assured me she seemed perfectly normal after service and ate her food, yet everything pointed to the injury occurring then.

IV.—Severe Colic in a Heifer.

A red shorthorn heifer, in calf for the second time, was noticed uneasy about 10 o'clock on the morning of October 22. When I saw her at noon I found all symptoms of severe abdominal pain—kicking

at the abdomen, lying and rising, and bellowing, with occasional periods of groaning. A dose of Chloral was administered, but about 6 o'clock the condition re-occurred and continued until 10, when a similar dose was given. The cowman stayed with her all night, and informed me next morning that she became uneasy about 11 o'clock and carried on as before until about 7 o'clock. When I saw her about 7.45 she seemed quite better, but all food was refused for 24 hours.

A careful watch was kept for some days after, but the animal recovered completely, calved normally, and nothing further was noticed.

CHOKED BY A PLACENTA.

By H. BEGG, F.R.C.V.S.,
Chief Veterinary Inspector for the County of Lanark, Hamilton.

A few weeks ago I was called to examine the carcase of a cow which was reported to have died suddenly, the case being suspected to be anthrax. I was told on arrival at the farm that the cow was at the bottom of a ravine, but it was not suggested that she had been pregnant.

When I arrived at the place where the carcase lay I saw a well-formed, newly-born calf sitting complacently under the hedge near it. Upon viewing the cow I observed about fifteen inches of placenta protruding from the mouth, the remainder being out of sight down the throat. I tried to pull it up, but was unable to move it, and, as the cause of death was obvious, I did not make a post-mortem examination.

CHOKED BY A PLACENTA.

By F. G. HARVEY, F.R.C.V.S.,
St. Columb.

I was asked to report upon the death of a Devon cow, fifth or sixth calf. She had calved at 7 a.m. and appeared all well when seen at 9 a.m. At 11 a.m. she was found dead, the appearance of the carcase giving no indication of the cause, the mouth being clear. On post-mortem examination about one-third of the membranes were found to have passed into the trachea, completely blocking it, and the cause of death was obviously asphyxia due to this.

A second case also came recently under my notice in which an ewe swallowed her placenta and became choked. Luckily the owner was only a short distance away and saw the animal in difficulties, running up in time to pull the membrane away and save its life.

POISONING IN SHEEP BY RHODODENDRON PONTICUM (*VAR. COMM.*).

By K. A. MILES, M.R.C.V.S.,
Husband's Bosworth, Rugby.

On April 9, 1922, six cross-bred ewes and one yearling ram were turned out into a field adjoining a nursery, after being confined in buildings, owing to a heavy fall of snow, since the previous day. They were apparently in this nursery for an hour, and were brought back into another pasture at 2 p.m., where they remained until 6 p.m. that evening. They were then driven into a building, the owner observing that they were dull and unsteady in gait. They refused their usual ration of bran and cake, etc. The ram and one other ewe then started to vomit, bringing up a greenish, slimy mass, staggered violently, and frothed at the mouth. The owner, suspecting poisoning, immediately dosed these two with linseed oil, half-a-pint each, which produced the symptoms described below.

I was called in to attend to these sheep on the following morning, April 10, 1922, about 10 a.m. One ewe had died at 4 a.m.; the other six were lying down, looking dull, but showing no other prominent symptoms.

Before making any further examination of those alive I made a post-mortem on the carcase, with the following results:—

Subcutaneous venous congestion. Abdominal organs normal, excepting liver, which showed a deep blue colour, which remained after exposure to air. Rumen contained a large mass of food, with an abundance of rhododendron leaves and stalks. No leaves were detected elsewhere. I also found evidence of gentianella leaves and a variety of andromida; both these latter are, however, I believe, non-poisonous. Heart flaccid and empty of blood. Lungs congested.

Examination of the living animals revealed:—Hot extremities; accelerated respiration; pulse rapid, but weak; temperature 103; gait unsteady; grinding of teeth, but little salivation; bowels normal, but frequent.

Each sheep was dosed in turn with Ol. Lini. made into an emulsion with Sod. Bicarb. and water. After the first attempt at swallowing most alarming symptoms appeared. The animal seemed to be choking, attempted to vomit, and staggered and plunged violently. One or two of them turned complete somersaults, salivation was pronounced, respirations hurried, grunting and groaning, expression of pain. These symptoms abated in about 10 minutes after administering dose. Three of the ewes died in 2 hours time. The ram and one ewe died that evening. The sixth ewe, the only one barren, showed only slight symptoms and completely recovered.

As drenching caused such distress no further medicine was administered.

I notice in an old botanical book that rhododendron leaves, made into a decoction, were used for rheumatism in Russia. It was also pointed out that no liquids must be drunk until several hours had elapsed, otherwise choking and vomition would occur.

PITUITRIN RECORD AND ASCITES IN THE DOG.

By G. MAYALL, M.R.C.V.S.

FROM my experience of pituitrin I consider it to be a drug which does all that it is asserted it will do, and to be one of the therapeutic agents which, unlike many others I can name, does not let us down. It is chiefly recommended for uterine inertia, and it certainly does waken up weak labour pains in the bitch. It also increases the force of the heart-beat and lowers pulse rate.

Case 1.—Called to a Pekinese bitch "Fifi," which I had attended at a previous pupping. Found part of a decapitated pup in the passage, labour pains very weak, pulse rate 120. It was impossible to deliver this pup manually, and my experience of the use of instruments in these cases has not been a very happy one on the whole, although I have had some good results. Washed and asepticised the skin at the back of the elbow and injected 0.5 c.c. pituitrin (Parke-Davis). This at 9 p.m.

Next day pulse rate 100, bitch had parted with the headless body of a pup, and a complete one dead. Time 10 a.m. The owner told me she was delivered of the headless pup at 1 o'clock in the night and the dead one soon after.

Case 2.—Pekinese bitch "Queen." Found her with weak labour pains and making no progress. First time in whelp. Gave her an injection of pituitrin as above. One pup born about 5 hours after. She only had the one, and made a perfect recovery.

Case 3.—Airedale bitch "Floss," first time in pup. I had attended her whilst pregnant for broncho-pneumonia. Labour pains weak. An injection of 0.5 c.c. of pituitrin resulted in the delivery of two pups, one alive and one dead. She did well afterwards.

ASCITES IN THE DOG.

A Welsh terrier "Peter," brought in with an enlarged abdomen and a sepulchral cough. In good condition and fairly lively. Laboured breathing, and on palpation and percussion diagnosed abdominal dropsy. This dog was tapped on May 10, May 17, June 3, 8 16, and July 4, and about 10 quarts of fluid removed from him. He was a good little patient, quiet, brave and uncomplaining, and an excellent mannered dog. After tapping I injected him with collosol iodine

and adrenalin. The adrenalin had a good result on a rather weak heart, but neither of the drugs used seemed to have much effect on the rapid secretion of fresh dropsical fluid, and I have never known a case of canine ascites where the fluid re-accumulated so quickly after tapping as in this one. The cough disappeared after the tappings and re-occurred, although not so badly, as the fluid came again. Internally the dog had liver pills, grey powder and Epsom salts. He is still alive at the time of writing (July 9), and generally seems pretty fit and in good condition. Speaking with a medical friend, and discussing the case, he told me that in the human subject they open the abdomen up and look inside and *swab the peritoneal surfaces with sterilised liquid paraffin.* The effect of the paraffin is to inhibit the internal secretion of the dropsical fluid. I read of this method in foreign literature some years ago and commented on it in THE VETERINARY JOURNAL. It seems to me that this procedure might be feasible and beneficial in the dog. Our present treatment of ascites, to my mind, seems to be neither the best nor most satisfactory that it is possible to evolve.

Personal.

THE Veterinary Profession was well represented at the recent annual dinner of the Royal Society of Medicine on July 6, the President (Sir John Bland-Sutton, F.R.C.S.) making a graceful allusion to the benefits to be derived from the collaboration of the two professions in the fight against disease. Amongst those present was Mr. G. H. Livesey, M.R.C.V.S., who, as President of the Central Veterinary Society, was one of the guests of the evening. Nearly 300 sat down, and every branch of medicine was officially represented. The gathering, which included the Minister of Health (Sir Alfred Mond), was a very distinguished one.

NOTICES.

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